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running head: INJURY MENTAL REPRESENTATION

Exploring the Mental Representation of Athletic Injury: A Longitudinal Case Study.

Ineke Vergeer

University of Durham, UK

Key words

injury; mental representation; mental imagery; information-processing; physical self

### Abstract

Background and purpose: Although “injury-related information processing” has been identified as an important element of athletes’ psychological reactions to injury, knowledge of the mental representation of athletic injuries and their fluctuations over time is still rather limited. The purpose of this study was to enhance this knowledge by exploring an athlete’s injury-related thoughts, sensations and images throughout the recovery process, using a prospective, longitudinal design. Method: The participant was a 28-year old male rugby player who had sustained a severely dislocated shoulder. Eight unstructured interviews were conducted over a period of 20 weeks, while a follow-up interview took place three years post injury. The interviews were audio-taped, transcribed, and analysed using qualitative analyses procedures. Results and conclusions: Four interdependent themes emerged from the interviews: (a) awareness, (b) mental imagery, (c) mental model of the injury, and (d) mental “itinerary” of the recovery process. The temporal dynamics of the recovery process were evident in the flux of attention-demanding properties of the injury; (dis)appearance of images over time; increasing complexity of the mental model; and construction and “concretisation” of the mental itinerary. Furthermore, the role of the athlete’s desired self-concept in shaping his inferences, actions and emotions, emerged as a fifth theme. The findings were synthesised into a “multi-track” conceptualisation of the athlete’s covert and overt injury-related activities over time.

## Exploring the Mental Representation of Athletic Injury:

### A Longitudinal Case Study.

Psychological reactions to sports injury have received increasing attention from researchers in the last 15 years (for reviews see Brewer, 1994; Evans & Hardy, 1995; Wiese-Bjornstal, Smith, Shaffer, & Morrey, 1998). Studies have shown a variety of reactions, most indicating emotional upheaval (e.g., disbelief, frustration, perturbation), as well as a range of cognitive and behavioural coping strategies (Bianco, Malo & Orlick, 1999; Udry, Gould, Bridges, & Beck, 1997). There are also indications that emotional distress diminishes over time as recovery progresses (Evans & Hardy, 2002; McDonald & Hardy, 1990).

Emotions are not the only psychological reactions to injury, however. As Udry et al. (1997) found, “injury-relevant information processing” also forms a substantial component of athletes’ reactions to injury, but research on this component has thus far been limited. Udry et al. (1997) reported experiencing pain, awareness of injury severity, questioning, and recognizing negative consequences as the higher order themes making up injury-relevant information processing. Their analysis focused on athletes’ immediate reactions to their injury though, and did not include a more longitudinal or extensive exploration of this component.

In an attempt to shed some light on the nature, role, antecedents and consequences of injury-relevant information processing, this paper describes the results of a case study that focused on an athlete’s mental representation of his injury over time. The study aimed to explore any dimensions along which information about the injury was organised in the athlete’s mind, and how these changed throughout the recovery process. A particular interest was directed at the nature of any injury-related images that would form part of the mental representation, as some forms of imagery advocated for and used by injured athletes, such as healing imagery (visualizing the internal healing process, Ievleva & Orlick, 1991; Sordoni,

Hall, & Forwell, 2002), and rehabilitation imagery (visualizing oneself progressing successfully through rehabilitation, Green, 1992), would require a visual and/or kinaesthetic representation of the injury or injured body part, but research into the nature of injury-related images is still scant. The study employed a qualitative, prospective and longitudinal design, consisting of a series of interviews with a severely injured rugby player. By examining the experiences of one athlete, in-depth and over time, it was hoped that a holistic perspective of the mental representation could be gained, which might then serve as a framework for further investigation of injury-relevant information processing.

### Method

The participant in the study was a 28-year old rugby player who sustained a severe dislocation of his right shoulder during a match in late February. At the time of the injury he was in his final year of a sports science degree at a university in the north of England. The player, Aidan (not his real name), had been involved in competitive rugby League for 12 years, 8 of which at semi-professional level. When the injury occurred he had taken a year out from semi-professional rugby and was playing in a lower division regional game. It was his first-ever shoulder injury, although he had sustained a number of other previous injuries.

Eight interviews, varying between 45 and 105 minutes in duration, were conducted over a period of 20 weeks. The interviews took place at 21, 35, 42, 63, 77, 91, 112, and 156 days post injury, respectively. A follow-up interview was also conducted at three years post injury. All interviews were conducted by the author, who was known to Aidan as a member of the lecturing staff on his degree programme. However, the author was not involved in any direct teaching or assessment for the remainder of his programme and throughout the duration of the study. Hence, there was a relationship of familiarity and trust but not of dependence. Aidan was assured of anonymity and confidentiality, and signed an informed consent form prior to commencement of the interviews. The interviews were conducted in the

author's office. Dates were selected in part to allow for medical visits in between interviews, and in part to fit in with Aidan's timetable. The follow-up interview was arranged after a chance-encounter three years after Aidan left university, and was used to determine the long-term effects of the injury, and to check the state of his mental representation at that time.

The interviews were open-ended and semi-structured in nature (Smith, 1995). In each interview, Aidan was asked to describe what had happened in the preceding weeks in relation to his injury as this provided the context in which information about the injury would be processed. Probes were then used to elicit descriptions of any injury-related sensations, thoughts and images throughout this period. This resulted in an exploration of topics that were salient in his mind at the time of that interview, but with exploration of related sensations, thoughts and images. Occasionally, when Aidan did not spontaneously refer to an issue that had been salient during the previous interview, the interviewer would inquire what his current experiences with that issue were. Both the data collection and data analysis were informed by the author's personal background, which included degrees in psychology, cognitive social psychology, and sport psychology, training in qualitative research and counselling, and particular familiarity with the areas of mental imagery and psychology of sports injury.

### *Analysis*

The interviews were audio-taped and transcribed. Due to practical limitations in time and resources, the main analysis took place after the first 8 interviews had been completed. The data were analysed inductively, using procedures common in qualitative analysis (Henwood, 1996; Smith, 1995). Following a process of open coding (Strauss, 1987) in which data were scrutinised very closely and basic questions were asked regarding what each statement could be indicating, a process of focused coding was implemented, in which the most relevant open codes were used to code larger chunks of text (Charmaz, 1995a). The

latter were subsequently grouped together and studied in more depth, with particular attention paid to changes over time. Regular memo writing was employed during data analysis to keep track of and elaborate emerging analytical insights (Glaser & Strauss, 1967). Results and insights were also regularly discussed with a colleague<sup>1</sup> who acted as peer debriefer (Lincoln, & Guba, 1985). Although the analysis contained elements of grounded theory, this was not intended to be a full-scale grounded theory study. The purpose was merely to identify elements and highlight possible relationships that could enhance our understanding of the information-processing reactions to injury and inform future research.

The results are presented below in the following manner. First, a chronological outline of events, including some impressions of emotions as they shone through in the interviews, will be presented to provide a contextual perspective. This will be followed by a description of the main themes that emerged from the interviews. In the final section, a further interpretation of the themes is sought through links with relevant literature and integration into a tentative conceptual model.

## Results

### *Context of the Recovery Process*

The day after incurring the injury, Aidan saw a specialist in the hospital who told him that there was a 70% chance of reoccurrence and that he might never play rugby again, which was very distressing news to him. By the time of the first interview (week 3), Aidan had not had any more medical appointments, nor any treatment, and was still wearing his arm in a sling. As the injury was to his dominant arm, it incapacitated him considerably. Between the first and second interview, Aidan received some further distressing news during a hospital visit, suggesting that the numbness he was experiencing could be a sign of nerve damage and might jeopardise his plans of joining the police force. However, a couple of days later, an informal consultation with one of his lecturers (“Mark”, a physiotherapist), laid to rest some

of these fears, as Mark explained the distinction between different types of nerve damage and conveyed his impression that it was probably not serious. By week 5 (interview 2), Aidan still had virtually no mobility or functional use of his arm, and did basic home-based exercises to stabilise the joint. He also attended regular physiotherapy sessions with N.H.S.<sup>2</sup> therapists, and some with Mark, which continued throughout the study. By week 6 (interview 3), he had a lot more movement in his shoulder, but still no strength or functional use.

During this time Aidan also consulted a specialist in his home county whom he knew from his days as a semi-professional rugby player. This specialist showed disappointment with Aidan's progress and concluded that the injury might have entailed more than a basic dislocation. Aidan's reaction to this event was "doom and gloom", concluding that the injury was more serious than he thought. By week 9 (interview 4), he reported continued improvement in range of motion, and some small improvement in strength. He performed exercises and stretches 8 to 10 times a day at this time. By week 11 (interview 5), he had started going to the gym, where he did rehabilitation exercises as well as cycling and running. He recounted that his shoulder was sore after a night out drinking and dancing.

Following this interview, Aidan became very busy with his exams, only attended one physiotherapy session, did little home-based rehabilitation and did not go to the gym at all. In week 13 (interview 6), he said he felt that progress had "petered out" because of his lack of commitment to his rehabilitation. He concluded that his shoulder was "somewhat stronger" though, as it was not sore after a rather rough night out, and he fully anticipated returning to his rehabilitation regime in the coming weeks. Despite these intentions, however, by week 16 (interview 7), he still had done relatively little, due to the pressure of writing his dissertation. During this time he also visited a sports physiotherapist in his home county, who told him that he was "cheating" by using inappropriate muscles to lift his arm, and gave him a number of "back to basics" exercises to work the proper muscles. However, although he clearly



acknowledged the necessity of the exercises, he did not do them because he considered them boring. He did nevertheless use his shoulder considerably in other activities, in particular swimming and manual work in a summer job. He also returned to, somewhat modified, rugby training, though not to competition. By week 22 (interview 8), he was still limited in the exercises he could do, and his shoulder still felt stiff and somewhat sore when lifting his arm above his head.

Three years later, in the follow-up interview, Aidan reported that he had regained full use of his shoulder for everyday and fitness activities, but that the injury had ended his rugby career. He had not joined the police force, though for reasons unrelated to the injury. Overall, he was quite content with his life and level of activity.

### *Themes*

Four themes depicting interdependent dimensions of injury mental representation emerged from the interviews: (a) awareness, (b) mental imagery, (c) mental model of the injury, and (d) mental “itinerary” of the future. A fifth theme emphasising the importance of the athlete’s desired self-concept was also identified. The temporal dynamics of the recovery process were evident in the flux of attention-demanding properties of the injury; (dis)appearance of images over time; increasing complexity of the mental model; construction and “concretisation” of the mental itinerary; and adjustment of the desired physical self.

#### *Awareness*

The awareness dimension represented the extent to and way in which the injury dominated Aidan’s awareness over time. Because pain and discomfort demanded attention, they brought the injury into awareness. As these attention-demanding properties of the injury diminished over time, awareness gradually diminished. Over the course of the study, awareness changed from being “like a constant strain, all of the time” (interview 2) to being

almost absent. The changes over time were also reflected in gradual changes in the intensity or levels of awareness. When pain did no longer act as a constant reminder of the damage, reinforcing the need to be careful, there still needed to be a level of semi-awareness that would prompt him to be cautious when initiating movements for which the tissue was not ready. For example, in interview 7 he noted “A lot of the time I’m aware I’ve got to make an effort to actually lean over and pick things up because of the restrictions I’ve got.” This semi-awareness did not seem to be foolproof, however, as it could slip sometimes when he would forget having a “dodgy shoulder” and inadvertently engage in an action for which the tissue was not ready. This first started happening around the time of interview 3, when he indicated that he would get “a wee bit more careless, as the days go by ...”, and continued throughout the study, although the number of occasions where cautiousness was necessary gradually diminished. When he did experience pain after unthinkingly engaging in movements, this tended to re-activate his level of awareness: “Sometimes I do it subconsciously, but then it hurts and you’re made aware, then when you go and do the same thing again, you do it so it doesn’t hurt as much”<sup>3</sup> (interview 7).

In addition to the non-deliberate awareness of the injury resulting from pain or soreness, and the somewhat deliberate semi-awareness he experienced, Aidan also reported moments when he purposefully brought the injury into awareness during times when awareness was generally low or absent. These happened when he “tried out” new movements, and when he engaged in rehabilitation exercises, which he knew would cause pain but were essential for proper recovery. This deliberate seeking of pain for rehabilitation purposes appeared to become harder over time as periods of non-awareness started to dominate. For example, in interview 8 he commented

I'm not getting any pain as much. Maybe I'm not pushing, maybe that's why I need to see Mark again, he used to push you so you were going through the pain barrier, but I haven't been doing that in the last couple of weeks. Generally it feels quite fine.

Overall, the awareness dimension included a dynamic flux of states of non-deliberate awareness, non-awareness, semi-awareness, and deliberate awareness, shifting in magnitude across time.

### *Mental Imagery*

Aidan reported a variety of body-related mental images, which either occurred spontaneously or were conjured up more intentionally in the pursuit of recovery.

#### *Involuntary replay images.*

During the first interview, Aidan reported that he frequently experienced replay images of the accident. These images appeared mostly at times when his mind was "idle", were experienced as "quite disturbing", and he had to make an effort to get them out of his mind. The images closely resembled the actual situation in which the injury took place, though he tended to see himself in slow motion, and mostly from an outside perspective. Furthermore, there was an additional visual image attached to the picture that represented the sensation he had experienced at the time of the accident, namely that his arm was only attached by the skin. He described how he saw himself "... as if somebody was looking at it from the sidelines and they could pick my hand up and just wave my arm about with no resistance whatsoever". By interview 2, the frequency of replay images had greatly diminished. The quality of the images had also changed in that they had become less intense, milder and more fleeting. By interview 3, the images had virtually disappeared.

#### *Images associated with physical sensations.*

Some of the images that Aidan reported were associated with particular physical sensations, and seemed to serve the purpose of explaining or giving meaning to these

sensations. An interesting example is the only visual image of the inside of his shoulder that he experienced during the study. This image initially appeared in week 6, in response to a physiotherapist's explanation that detailed how, when the injury occurred, "the head of the humerus came right through and ripped the muscle fibres apart, the muscles at the front of the shoulder..." (interview 3). This explanation triggered the occurrence of a dynamic visual image, representing the movement of the bone "ripping" through the muscles, and helped Aidan's understanding of what had happened inside his shoulder. Once the image existed, Aidan then invoked it in subsequent weeks to help interpret impingement sensations that he experienced during exercises in the gym:

I get the picture, it's like the head of the humerus is touching them or trying to break through and that's what's causing that feeling [of impingement]. The sharp pain I get .... I visualise the head of the humerus trying to work its way out. (interview 4)

Over time, the occurrence of the image decreased as the frequency and intensity of the impingement sensations diminished. During the last three interviews, no more mention was made of this image occurring, and by the time of the follow-up interview, Aidan could not even remember having this image.

*Images of the injured shoulder being healthy (again).*

During the first four interviews, Aidan repeatedly reported that he often experienced images in which he saw himself making full(er) use of his shoulder. These images were commonly triggered by feelings of frustration and by the desire to use his shoulder again, as he had been able to in the past. They were prompted in particular when he did something with his healthy arm that the injured arm could not do. Later in the study, these images of functional use occurred mostly in the gym environment, and were then often conjured up more deliberately than the images that he experienced earlier. They involved imaging the injured arm copying the movements that the healthy arm had just completed. Aidan often

commented that he would “know that I used to be able to do it... [ ]. So I remember how I used to be when I do these things and that’s how I portray it when I’m doing my exercises” (interview 7). Interestingly, although these images were based on the memory of past activities, they were predominantly visual and generally involved an external perspective: “That’s an external picture, I see myself from the outside or standing next to me, lying on a table, extending my arm fully to what my other shoulder can do” (interview 6).

### *Healing imagery.*

Healing imagery was not something Aidan engaged in during his recovery. The technique was briefly discussed in the first interview<sup>4</sup>, where it emerged Aidan was unfamiliar with the idea, and, once explained, indicated that he would find it difficult to create healing images. He argued that this was because he did not actually have an internal picture of his shoulder, partly because the injury was complex and partly because he felt he lacked visual information about the inside of his shoulder. He also felt that he did not have the physiological knowledge necessary to envisage the healing process. Although he was moderately positive about the possible effect of healing imagery, he did not show much intention to try it himself, and, as emerged in the subsequent interviews, did not use it during his rehabilitation. Even after acquiring the “head-of-the-humerus” internal image, this did not prompt him to start creating healing images.

### *Mental Model*

The mental model dimension represented Aidan’s conceptions of the state of the injury and the consequences associated with it. It included perceptions and interpretations of symptoms, appraisals of progress, and inferences about implications, processes that continued throughout the entire period of the study. Over time, the mental model increased in complexity to accommodate changes in sensory experiences and newly available explanations.

*Constitution of the mental model.*

Input into the mental model came from two sources: interactions with medical personnel, and Aidan's own bodily experiences. The latter included in particular perceiving pain or other kinaesthetic sensations, and apperceiving the range of movement and functional use of the arm. They also included looking in the mirror and touching the injured area, which were activities he engaged in frequently. Both sources, medical and personal, remained important in shaping his mental model throughout the study.

For quite some time, 5 to 6 weeks, Aidan was mostly concerned with ascertaining the extent of the damage done and the long-term implications of the injury, interpreting a whole range of bodily experiences and evaluating medical speculations about the effect on his athletic and professional careers. After this period, his main focus shifted to estimates of progress. Initially, he inferred progress mainly from a reduction in the intensity and duration of pain, but gradually his inferences became based on a complex interaction between pain, the type of activity undertaken, and the amount of effort put into that activity.

Like the pain you felt the week before doing that movement, doing the same movement the following week the pain is not that sore even though you're doing exactly the same thing. But then you progress the pain again because you go even further, [ ] you see it and feel it, you feel less pain doing a certain movement, from the previous week and that means to me improvement. (interview 5)

Communication with medical staff at this time was important in that he relied on this to support his personal inferences of progress. Furthermore, he inferred progress from physiotherapy sessions with Mark, as these gave him a sense that he was doing the right things to help his recovery along.

I come out sweating and it feels like I've actually done a fitness session, 'cause it's hard work and it's sore and I go through a lot of pain, and I think you need to go

through pain barriers and cross the threshold to start gaining improvements.

(interview 5)

*Integrating information from different sources.*

The multi-source input on which his mental model relied sometimes led to confusion or worry when there were inconsistencies in the various messages. These could occur between different personal sources (e.g., “I do feel it’s slightly stronger, but when I look in the mirror I always feel there’s something not right”, interview 4); between personal and medical sources (e.g., “My shoulder is all over the place. But I have asked Mark and I have asked the physio about it, and they don’t seem to be that bothered about why my shoulder’s three inches higher than the other one”, interview 4), or between different medical sources (e.g., “different opinions all over”, interview 5).

When Aidan encountered worrying information he used every opportunity to resolve the issue that disconcerted him. Usually this meant trying to find out more or better information from different medical practitioners. This, however, increased the risk of encountering confusing or inconsistent information, as happened several times during the study.

*Temporal aspects.*

The temporal characteristics of Aidan’s mental model manifested themselves in increases in complexity over time. On the one hand, these increases showed in sharper differentiations in the perception and interpretation of symptoms, such as the different types of pain Aidan described throughout the study (e.g., “slow, stretching pain you’re in control of”, associated with rehabilitation exercises, versus “sharp, sudden pain, that you worry about more”, associated with inadvertent movements, interview 5). On the other hand, they showed in the incorporation of new explanations, which enriched the model by providing new insights and frameworks for attaching new information or sensations. For example, following

a hospital visit, the idea of nerve damage became part of Aidan's mental model (interview 2), and led to worry. But the notion became differentiated after Mark's explanation of the difference between sensory and motor nerve damage, and led to relief when Mark indicated that the nerve damage was probably sensory. In a subsequent interview, however, Aidan started to link his lack of strength to the possibility of motor nerve damage, hence, connecting the explanation with different symptoms. This then became another source of worry.

By increasing the complexity of his mental model, Aidan was able to form a relatively comprehensive and differentiated representation of the state of the injury:

When I look in the mirror, it's still out of line with the other. It's not symmetrical yet, it's a different height or a different angle to what it should be. Other muscles are over-compensating; the muscle that should be working to its full potential isn't. Hence the reason why it's at a different angle or a different height to my good left shoulder [ ]. I don't feel anything, I can do things. So I'm not as conscious about it anymore, until I actually see it in the mirror, and then I'll remember that I've got a really bad injury.

(interview 8)

### *Mental Itinerary*

The mental "itinerary" refers to Aidan's conception of the route to recovery. This conception resembled a traveller's itinerary of a journey, including such elements as the "destination" (quality and time of eventual recovery), "service stations" (appointments with medical practitioners), "milestones" (physical signs of improvement), and "transportation" (types of treatment needed).

*Destination: quality and time of eventual recovery.*

Both the quality and timing of Aidan's eventual recovery remained uncertain throughout the whole period of the study. He accepted quite early on that his recovery was going to be a "long, hard, slow process" (interview 4), and he never attached a specific time



line to his recovery. When asked if he had any expectations about his recovery he tended to say he did not know and push it into an indefinite future. Even in interview 8 he still expressed uncertainty about the outcome:

I don't know if I'll ever play again [ ] It has got better, but is it going to fully recover?

I don't really know that, ask me in December, I think, in December [5 months away]

I'll have a much better idea of how good it's going to be.

Whether the uncertainty was justified from a medical perspective was impossible for the interviewer to gauge, but it was clear that Aidan accepted a level of uncertainty about the final outcome throughout the duration of the study. This may have been a double-edged sword, as one the on hand it kept his hopes alive, on the other, it left him pre-occupied with any indicators of the final outcome, negative or positive. Conflicting or disheartening information from medics and discrepancies in his own observations all undermined his confidence in the possibility of reaching the desired endpoint. At the same time, he used all possible indicators to support a belief in the possibility of full recovery, as was evident in his continual efforts to find more suitable medical care, and his frequent checking and prodding of the injured area for progress. Finding positive indicators buoyed his spirits: "I'm just a lot more optimistic once I've seen Mark, just the way he is, the way he seems to think everything's going quite well, it perks me up a lot" (interview 5).

*Service stations: medical appointments.*

Throughout the study, Aidan had a series of appointments with medical personnel, some available to him through regular N.H.S. services, some sought out by him through personal connections. Even though he repeatedly commented that the treatment received via the N.H.S. was of very limited value to him, he attended all the scheduled appointments. The medical appointments served a range of purposes. For example, in interview 2 he declared: "I want a physio, I need a physio; until I get the physio then I don't really know what's going to

happen”, expressing both the need to specify the elements of his itinerary and the importance of medical information in the construction of this itinerary. Appointments with specialists were anticipated as opportunities to ask questions, get referred to physiotherapy, or obtain a second opinion. Appointments with physiotherapists served as opportunities to gauge the extent and nature of the rehabilitation process, receive new exercises to work on, attain permission to engage in new activities, and seek reassurance about progress: “Hopefully the physio will see an improvement on Monday in my arm and then I hope Mark sees an improvement when I see him” (interview 5). Later in the study, after the lapse during his exam time, Aidan also anticipated the appointments as an impetus to start working hard again.

In general, the medical appointments seemed to have an important function in structuring Aidan’s mental itinerary, perhaps because they were the only aspects that naturally had a specific time attached to them.

*Milestones: physical signs of improvement.*

On several occasions, Aidan mentioned milestones that he regarded as indicators of good recovery and was looking forward to reaching, for example, lifting a very light weight (interview 2), getting back in the gym (interview 3), or moving his arm unassisted above his head (interview 8). The most frequently mentioned milestone was regaining his muscle bulk, which he saw as a sign that he was on the right track and might reach his desired destination: “Still more or less that I get back to the way I was hopefully; that will be when I realise I get the bulk back” (interview 3). As with the final destination, Aidan generally had no specific expectations about the times when he might reach these milestones.

*Transportation: types of treatment.*

Based on his previous experiences with injury and knowledge gained from his degree, Aidan had general expectations about the rehabilitation process, but he needed the input from

the physiotherapists to know exactly which exercises he needed to do, and when to move from one type of activity to the next. Aidan's intention to engage in rehabilitation exercises was strong throughout, even during the time when the pressure of his study was high and he had neglected his exercises. His perceptions of the exercises were also clearly linked with evaluations of enjoyment, and with beliefs and feelings about their efficacy. These, in turn, appeared to play a role in his adherence to them. For example, early in the study, he described stability exercises as "the boring stuff; the stuff where you feel like you're not doing anything". Nevertheless, he adhered to them because he saw them as essential. At the same time, he was hoping to get permission to start doing exercises in the swimming pool, because

...then you know it's happening, it's starting to work, you feel like you're doing something. At the moment, the only two exercises you get, you don't feel like they're doing any good. You wait to start doing something that you feel is doing some good, swimming pools, all these movements, just build up... (interview 2)

Interestingly, although he adhered to the boring exercises early on in his rehabilitation, he neglected to do so later on, after he was told to "return to basics" (interview 7), despite fully acknowledging the necessity of the exercises. He preferred to engage in more general physical activities, like swimming or touch-rugby, which he enjoyed because they gave him a sense of work-out.

#### *Temporal aspects.*

In summary, the mental itinerary represented a dynamic map of images and plans at varying levels of specificity. As a temporal characteristic of this dimension, anticipated events "concretised" over time, turning into actual experiences and then memories, thereby providing the basis for new expectations and plans. It did not seem possible to have a mental picture of the complete route to recovery at the start. There were general expectations, but

more detailed expectations often needed input from a physiotherapist and tended to be filled in up to a few weeks in advance.

### *Role of desired or ideal self*

A strong pre-occupation for Aidan throughout the study, evident in his focus when looking in the mirror and touching the injured area, the inferences he made, the signs of recovery that he set himself as milestones, and his images of being healthy again, was the loss of muscle mass and any progress made towards regaining it. Aidan several times explained the reason for this importance as the necessity to be strong as a rugby player, something that he had been used to for many years.

How much bulk and weight I've lost, to me that's a big issue. Because I've always ....., because of the position I play in rugby, you need to have that vision of 'I'm big, I'm strong', because if you're not bigger and stronger than your opponent then you're in for a hard time when you play rugby. It's just an image I've got all the time when I go into the gym, I want to lift the heavy weights, keep my strength up for the rugby etc, that's where that all stems from. (interview 2)

These comments indicated that being muscular and powerful formed a significant aspect of his desired or ideal physical self. As a consequence of the injury there was a huge discrepancy between his current and desired self, and this discrepancy appeared to have a strong impact on his perceptions and actions. In the later stages of the study, however, as a return to competitive rugby remained uncertain (and eventually became impossible), this desired self-image seemed to gradually be replaced by an image of “merely” being a physically fit and active person.

### Integration and discussion

It was evident that the five identified themes were interdependent, and also, as filtered through in the interviews, inextricably linked to emotions and behaviours. In reflecting on

these themes and their interrelationships, it seems useful to conceptualise an injured athlete's covert and overt activities during recovery as a “multi-track process” (Figure 1). The various themes and their longitudinal manifestations may be seen as occupying different “tracks” that exist and evolve simultaneously over time, frequently interacting and affecting one another, but also at times merely existing concurrently.

Awareness is closely, though not necessarily categorically or diametrically, linked to the injury's physiological state of damage and healing, and therefore bound to change over time in accordance with tissue healing. Without physical damage or malfunctioning, we tend not to be aware of specific body parts, and experience our bodies as indelible and unproblematic parts of ourselves, a state that has been termed “primary immediacy” (Gadow, 1982; Kleiber, Brock, Lee, Dattilo, & Caldwell, 1995; Sparkes, 1998). In this unproblematic state, the body “disappears from consciousness” (Leder, 1990). Injury brings the body into awareness, creating a state of “disrupted immediacy” (Gadow, 1982). The awareness track represents the processes by which the experience of the body gradually returns to a state of primary immediacy. These processes entail a constant flux in states of awareness.

Furthermore, there are times when there may be a sense of non-awareness while nevertheless a semi-awareness is needed to avoid engaging in activities for which the tissue is not ready, and there are times when non-awareness has become so dominant that deliberate and purposeful effort is needed to stimulate the awareness necessary to engage in rehabilitation exercises. Aidan's experiences suggest that this flux in awareness is linked to adherence behaviour, as non-deliberate awareness acts as a reminder of the need for rehabilitation exercises, whereas in periods of non-awareness, these reminders need to be more deliberately sought from other sources.

The ideal or desired physical self appears to have a strong motivational effect on actions, inferences (mental model), and emotions. In the sociological and health literature,

this effect has been linked to the importance of physical functioning for the attainment of desired identities (Charmaz, 1994, 1995b; Sparkes, 1998). While an unproblematic physical self allows the person to strive for, manifest and maintain various personal identities, a problematic physical self will interfere with achieving these identities. In Aidan's case, his desired physical selves were the ones necessary to recapture his pre-injury athletic identity and to achieve the professional identity of a police officer, with a shift near the end of the study towards the self needed for the identity of a physically fit and active person.

The motivational effects of the desired physical self were noticeable throughout the study, especially when there was significant discrepancy between the present and desired physical self. The motivational and emotional effects of discrepancies between current and ideal or feared selves have been extensively described in the cognitive social psychology literature (Higgins, 1987, 1996a). This literature also emphasises the need for activation of the discrepancy in order for the effects to occur (Higgins, 1996b). Linking this to injury, it is likely that awareness has the effect of *priming* the discrepancy between current and ideal or feared selves, thereby activating the associated motivational tendencies (Higgins, 1987; 1996b; Karniol & Ross, 1996). Aidan's experiences further suggest that there is a strong "pull" from the possibility to engage in activities that contribute to a *sense* of the desired physical self (e.g., swimming, running, a physiotherapy session that makes one sweat) that may override the choice of activities that depend on rational decisions (e.g., doing necessary but "boring" exercises involving only small movements), in particular once the injury has healed sufficiently to enable engagement in other activities. It may be that as long as rehabilitation exercises are seen as the *only available* strategies to achieving the desired physical self, triggered motivational tendencies are likely to stimulate adherence to these exercises. As soon as other strategies become available, however, rehabilitation exercises may have to compete against these activities.

Aidan's need to create at least a rudimentary mental itinerary was evident early on in the recovery process, and it was clear that the content and specificity of his itinerary had implications for the way in which he felt and acted. Indirectly, some studies have implicated that having a comprehensive and specific mental itinerary, in the form of clear information, goals and guidelines regarding rehabilitation, may be associated with lower risks of psychosocial problems (Johnson, 1997), better adherence (Pizzari, McBurney, Taylor, & Feller, 2002), and faster recovery (Ievleva & Orlick, 1991), hence affecting emotions, behaviours and physical progress. Mental itineraries are not in themselves plans, but they may form the basis for creating action plans for the future, and thereby help in overcoming volitional problems (Gollwitzer, 1996). How specific the mental itinerary needs to be in order to allow for effective goal setting and planning at various stages of the recovery process is something to investigate in future research. Construction of a mental itinerary is clearly dependent on medical input. At the same time, it appears that medical appointments themselves have a structuring function in the athlete's itinerary, as they may be the only goals that are fixed in time, and often enable the athlete to fill in details for the next leg of the journey.

The concept of mental models is well-known in the literature on reasoning and decision making (Johnson-Laird, 1983; Legrenzi, Girotto, & Johnson-Laird, 1993), where they usually refer to the mental representation that people construct and consult in their attempts to solve a problem. In this study, construction of a mental model was an inevitable by-product of Aidan's attempt to make sense of his injury-related bodily experiences and any medical explanations he received. Because of the involvement of self, athletes' mental models of their injuries are likely to be rather different from medical conceptions of the injuries. Although fed by accurate medical information, an athlete's mental model, and any activities used in constructing it, is also based on information derived from (repeated)

personal observation of symptoms, and this study indicates that the attention to and interpretation of symptoms is strongly guided by the athlete's desired physical self.

In models of psychological reactions to injury, emotions are commonly seen as resulting from athletes' appraisal of the injury, i.e., the meaning they attach to the situation (Brewer, 1994; Johnston & Carroll, 1998; Wiese-Bjornstal et al., 1998). According to Lazarus (1999), emotions result from primary appraisal of goal congruence and secondary appraisal of what can be done. Perceived facilitation of personally relevant goals is expected to lead to positive emotions, thwarting to negative emotions. In the present study, negative emotions were particularly strong when Aidan inferred that the possibility of achieving the physical self necessary for a desired identity was in jeopardy. Positive emotions generally followed from inferences of progress that would support his hope for or belief in the eventual attainment of his desired physical self. However, the study also suggests that lack of progress does not necessarily lead to negative emotions, as Aidan was not particularly bothered by the stagnation during his exam time. This may have been because he felt, having strong efficacy and fairly strong outcome beliefs, that he could speed up the healing at any time by re-engaging in his rehab regime. Furthermore, awareness was already declining during this period, and other aspects of his identity took precedence in his goal hierarchy, thereby becoming more important in determining the appraisals that mediated his emotions (Lazarus, 1999).

While mental imagery initially emerged as a separate theme, when integrating the results in the "track model", it seemed more fitting to locate the various images within different tracks, as they appear to be associated with one or more distinguishable processes. For example, replay images seem to belong in the awareness track, as they represent a form of non-deliberate awareness. An explanation for their occurrence may be the, subconscious, need to integrate the trauma into previous psychological structures, achieved through re-



experiencing the traumatic event (Horowitz, 1976; Witvliet, 1997). Images associated with physical sensations would seem to belong to the mental model track, as they serve to facilitate understanding of medical information, and support explanations of physical sensations. They are also linked with emotions as their explanatory function will mediate appraisals of the meaning of the physical damage. It may be argued that more purposeful use of imagery, such as imaging copying the movement of the healthy arm during rehab exercises or engaging in healing imagery, is associated with the behaviour track, as it is something the athlete needs to actively undertake, rather than something that occurs spontaneously. Although they were not explored in this study, it is conceivable that the mental itinerary track may give rise to visual and kinaesthetic images of, for example, goals, rehabilitation exercises, or various outcome scenarios. These could be spontaneously occurring or purposefully conjured up, and might provide targets for interventions.

Images of healthy physical functioning seemed to be associated with the desired physical self track, in particular images prompted by the frustration of not being able to execute a particular activity. Aidan's story suggests that frustration gives rise to visual images of the self in action, which are drawn from memory and may be projected into the future. Sport psychology's mental imagery literature might class these images as motivational (e.g., Sordani et al., 2000, 2002), however, to what extent they actually act as motivators to adhere to rehabilitation exercises is debatable. As these images seem to occur spontaneously, it may be that their motivational effect would depend on the athlete's interpretation of the achievability of the image. Linking the use of imagery to outcome beliefs may be something to consider in future work. The fact that Aidan's images of healthy functioning tended to be external in perspective is interesting and begs the question whether the contradictory somatic experience precludes an internal and kinaesthetic perspective, or whether an experienced discrepancy between current and desired self leads to a more distant, external perspective. In

this light, it is also worth investigating whether it would be possible to draw the desired self closer by helping the athlete use imagery that involves a more internalised perspective.

Despite Ievleva and Orlick's (1991) finding that healing imagery is more common in fast healers, not much is known about which factors induce athletes to use this type of imagery or prevent them from using it. Aidan accepted early on that his recovery was going to be long and slow; he also argued that his injury was too complex and his knowledge of healing too limited to create a visual picture. Whether there is a relationship between injury complexity, acceptance of slow recovery, and possibly motivation, is worth exploring in future studies on healing imagery.

In conclusion, through examining the injury mental representation of one athlete, in-depth and over time, this study enabled the identification and tentative integration of several dimensions of injury-relevant information processing and their longitudinal manifestations. By pointing out the role of different types of awareness, the structure and importance of a mental itinerary, the increasing complexity of a mental model, and the motivational role of an athlete's desired physical self, the identified dimensions offer a more comprehensive understanding of injury-relevant information processing and emotional and behavioural reactions, as well as frameworks for future research. The proposed "multi-track" model may be a useful conceptualisation of athletes' covert and overt activities during recovery. The study also highlighted the occurrence of spontaneous, in addition to more purposefully conjured up, mental images, and it is suggested that these images may be understood by placing them within different "tracks".

## References

- Bianco, T., Malo, S., & Orlick, T. (1999). Sport injury and illness: Elite skiers describe their experiences. *Research Quarterly for Exercise and Sport*, 70, 157-169
- Brewer, B.W. (1994). Review and critique of models of psychological adjustment to athletic injury. *Journal of Applied Sport Psychology*, 6, 87-100.
- Charmaz, K. (1994). Identity dilemma's of chronically ill men. *Sociological Quarterly*, 35(2), 269-288.
- Charmaz, K. (1995a). Grounded theory. In J.A. Smith, R. Harré & L. Van Langenhove (Eds.). *Rethinking methods in psychology* (pp.27-49). London: Sage.
- Charmaz, K. (1995b). The body, identity, and self: Adapting to impairment. *Sociological Quarterly*, 36(4), 657-680.
- Evans, L. & Hardy, L. (1995). Sport injury and the grief response: A review. *Journal of Sport and Exercise Psychology*, 17, 227-245.
- Evans, L., & Hardy, L. (2002). Injury rehabilitation: A goal-setting intervention study. *Research Quarterly for Exercise and Sport*, 73, 310-319.
- Gadow, S. (1982). Body and self: A dialectic. In V. Kestenbaum (Ed.). *The humanity of the ill: Phenomenological perspectives* (pp.86-100). Knoxville: University of Tennessee Press.
- Glaser, B., & Strauss, A. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Chicago: Aldine.
- Gollwitzer, P.M. (1996). The volitional benefits of planning. In: P.M. Gollwitzer, & J.A. Bargh (Eds.). *The psychology of action; Linking cognition and motivation to behavior* (pp.267-291). New York: Guilford.
- Green, L.B. (1992). The use of imagery in the rehabilitation of injured athletes. *The Sport Psychologist*, 6, 416-428.

- Henwood, K.L. (1996). Qualitative inquiry: Perspectives, methods and psychology. In J.T.E. Richards (Ed.). *Handbook of qualitative research methods for psychology and the social sciences* (pp. 25-40). Leicester, UK: British Psychological Society.
- Higgins, E.T. (1987). Self-discrepancy: A theory relating self and affect. *Psychological Review*, 94, 319-340.
- Higgins, E.T. (1996a). Ideals, oughts, and regulatory focus; Affect and motivation from distinct pains and pleasures. In: P.M. Gollwitzer, & J.A. Bargh (Eds.). *The psychology of action; Linking cognition and motivation to behavior* (pp.91-114). New York: Guilford.
- Higgins, E.T. (1996b). Knowledge activation: Accessibility, applicability, and salience. In E.T. Higgins and A.W. Kruglanski (Eds.). *Social psychology: Handbook of basic principles* (pp. 133-168). New York: Guilford.
- Horowitz, M.J. (1976). *Stress response syndromes*. New York: Jason Aronson.
- Ievleva, L., & Orlick, T. (1991). Mental links to enhanced healing: An exploratory study. *The Sport Psychologist*, 5, 25-40.
- Johnson, U. (1997). A three-year follow-up of long-term injured competitive athletes: Influence of psychological risk factors on rehabilitation. *Journal of Sport Rehabilitation*, 6, 256-271.
- Johnson-Laird, P.N. (1983). *Mental models*. Cambridge, MA: Harvard University Press.
- Johnston, L.H., & Carroll, D. (1998). The context of emotional responses to athletic injury: A qualitative analysis. *Journal of Sport Rehabilitation*, 7, 206-220.
- Karniol, R., & Ross, M. (1996). The motivational impact of temporal focus: Thinking about the future and the past. *Annual Review of Psychology*, 47, 593-620.

- Kleiber, D.A., Brock, S.C., Lee, Y., Dattilo, J., & Caldwell, L. (1995). The relevance of leisure in an illness experience: Realities of spinal cord injury. *Journal of Leisure Research*, 27(3), 283-299.
- Lazarus, R.S. (1999). *Stress and emotion; A new synthesis*. London: Free Association Books.
- Leder, D. (1990). *The absent body*. Chicago: University of Chicago Press.
- Legrenzi, P., Girotto, V., & Johnson-Laird, P.N. (1993). Focussing in reasoning and decision making. *Cognition*, 49, 37-66.
- Lincoln, Y.S., & Guba, E.G. (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage.
- McDonald, S.A., & Hardy, C.J. (1990). Affective response patterns of the injured athlete: An exploratory analysis. *The Sport Psychologist*, 4, 261-274.
- Pizzari, T., McBurney, H., Taylor, N.F., & Feller, J.S.(2002). Adherence to Anterior Cruciate Ligament rehabilitation: A qualitative analysis. *Journal of Sport Rehabilitation*, 11, 90-102.
- Smith, J.A. (1995). Semi-structured interviewing and qualitative analysis. In J.A. Smith, R. Harré & L. Van Langenhove (Eds.). *Rethinking methods in psychology* (pp.9-26). London: Sage.
- Sordoni, C., Hall, C., & Forwell, L. (2000). The use of imagery by athletes during injury rehabilitation. *Journal of Sport Rehabilitation*, 9, 329-338.
- Sordoni, C., Hall, C., & Forwell, L. (2002). The use of imagery in athletic injury rehabilitation and its relationship to self-efficacy. *Physiotherapy Canada, Summer*, 177-185
- Sparkes, A.C. (1998). Athletic identity: An Achilles' heel to the survival of self. *Qualitative Health Research*, 8(5), 644-664.
- Strauss, A.L. (1987). *Qualitative analysis for social scientists*. Cambridge, UK: University Press.

- Udry, E., Gould, D., Bridges, D., & Beck, L. (1997). Down but not out: Athlete responses to season-ending injuries. *Journal of Sport and Exercise Psychology, 19*, 229-248.
- Wiese-Bjornstal, D.M., Smith, A.M., Shaffer, S.M., & Morrey, M.A. (1998). An integrated model of response to sport injury: Psychological and sociological dynamics. *Journal of Applied Sport Psychology, 10*, 46-69.
- Witvliet, C.V. (1997). Traumatic intrusive imagery as an emotional memory phenomenon: A review of research and explanatory information processing theories. *Clinical Psychology Review, 17*, 509-536.

Figure 1

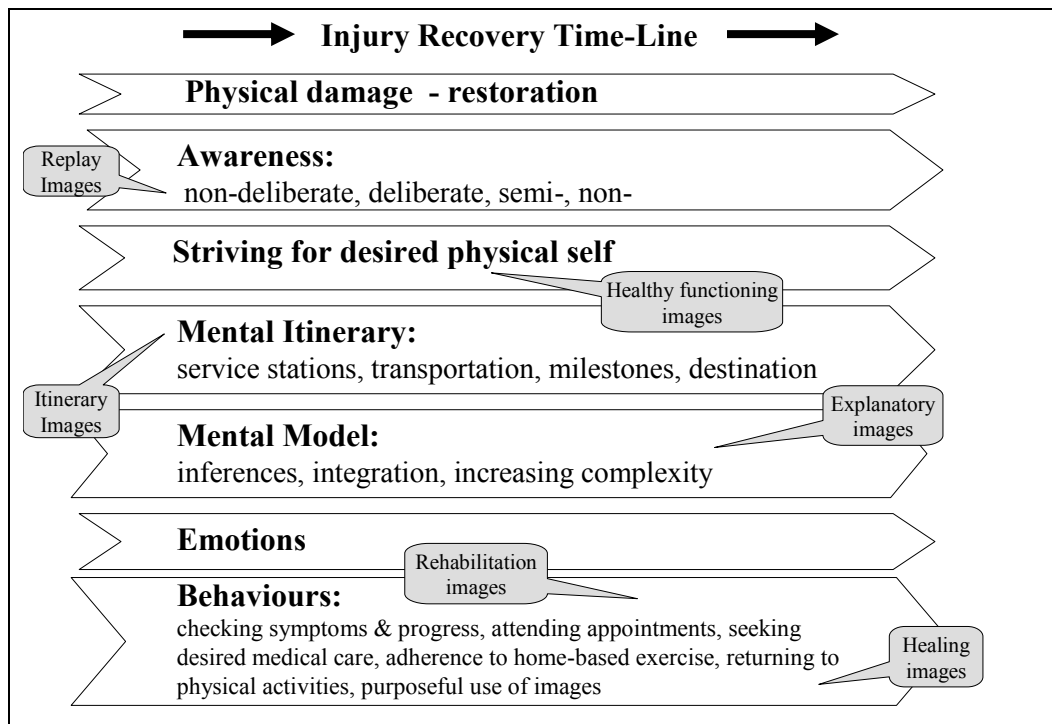


Figure Caption

*Figure 1.* A conceptualisation of injury recovery as a “multi-track” process.



Footnotes

<sup>1</sup> This was not the same person as the colleague referred to as “Mark” later in the article.

<sup>2</sup> The British National Health Service

<sup>3</sup> Quotes have occasionally been edited for the sake of brevity, but without losing the gist of the argument.

<sup>4</sup> It must be noted that the findings of the study could have been different if Aidan had decided to use healing imagery as a consequence of this first discussion. As it was merely raised as a question and no attempt at a guided intervention was made, this still would have been an independently conducted activity, however.

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